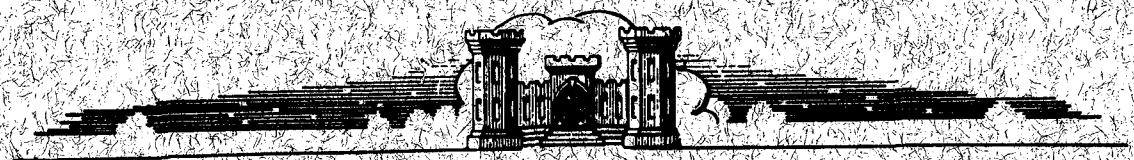


MILFORD HARBOR CONNECTICUT

SURVEY (REVIEW OF REPORTS)



U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

AUGUST 4, 1960

33

Rev 10/8/60

SURVEY

REVIEW OF REPORTS

MILFORD HARBOR, CONNECTICUT

SYLLABUS

The Division Engineer finds that the general navigation facilities at Milford Harbor are inadequate and that benefits are sufficient to warrant modification of the existing project to provide an additional 8.5 acres of anchorage area, 6 feet deep, on the west side of the inner harbor south of the City Wharf. The estimated cost of the project modification is \$220,000 exclusive of \$7,000 for pre-authorization studies and \$2,000 for additional annual maintenance. The benefit cost ratio for the recommended project modification is 1.5.

The project modification is recommended subject to the requirement that local interests contribute 50 percent of construction costs, said contribution presently estimated at \$110,000, provide necessary lands, easements and rights-of-way, and spoil disposal areas when and as required, and hold and save the United States free from damages that may result from construction and maintenance of the project.

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U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS

NEDGW

4 August 1960

SUBJECT: / Survey (Review of Reports) of Milford Harbor, Connecticut/

TO: Chief of Engineers, Department of the Army, Washington, D. C.

AUTHORITY

1. This survey report on Milford Harbor, Connecticut, is a review of previous reports and is submitted in compliance with the following resolution adopted July 30, 1954 by the Committee of Public Works of the United States Senate, as follows:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE that, the Board of Engineers for Rivers and Harbors created under Section 3 of River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers on Milford Harbor, Connecticut, published as House Document Numbered 77, Seventy-fifth Congress, First Session, and other reports, with a view to determining whether the existing project should be modified in any way at this time."

2. A review of report of survey scope was assigned to the New England Division by the Chief of Engineers on August 11, 1954.

PURPOSE AND EXTENT OF STUDY

3. A study has been made to determine the adequacy of the present Federal navigation project and the need for additional improvement. A detailed hydrographic survey consisting of soundings, probings and elevations was made, from which the nature of sub-surface material, estimated quantities to be dredged, location and extent of ledge rock and elevations of existing jetties were determined. Available maps, commercial statistics and other data pertaining to the harbor have been studied. A Public Hearing was held at Milford, Connecticut, on November 3, 1955, and information obtained therefrom is described hereafter, under the paragraphs on "Improvement Desired."

DESCRIPTION OF NAVIGATION CONDITIONS

4. Milford Harbor is located on the north shore of Long Island Sound, about 8 miles west of New Haven Harbor, about 8 miles east of Bridgeport Harbor and about 5 miles east of the mouth of the Housatonic River. The harbor comprises an outer bay about a mile square, lying between Charles Island and Welch's Point, and the tidal and navigable portion of Wepawaug River which extends nearly a mile from the northeast corner of the outer bay.

5. Depths at the entrance between Welch's Point on the northeast and Charles Island on the southwest are about 20 feet, but the outer harbor shoals gradually toward the shore. The Wepawaug River is about 600 feet wide for most of its navigable length, but narrows to about 200 feet both at its entrance and at the head of navigation about 400 feet above the City Wharf. A channel 100 feet wide has been dredged, from the outer harbor to 400 feet above the City Wharf, to a depth of 10 feet through the lower harbor to Merwin's Wharf, and thence 8 feet to above the town wharf. There is an anchorage basin 10 feet deep east of the channel near the mouth of the Wepawaug River. Of its authorized area of 6 acres, 2.3 acres was completed to the 10-foot depth and the remainder, never dredged and now inactive, has natural depths ranging in general from 0 to 2 feet. There is a 7.8 acre anchorage basin on the west side of the channel opposite Merwin's Wharf with depths of 10 feet in the lower 1.9 acres and 8 feet in the upper section. There are two riprap jetties at the entrance to the river. Maintenance dredging was completed in February 1956 in all the existing project except the East Basin, which presently consists of about one acre of usable 8-foot anchorage.

6. The outer harbor is sheltered from all but southerly storms. The inner harbor is landlocked, and its entrance from the partially sheltered outer harbor is further protected by breakwaters. Prevailing winds are from the north through the northwest in the summer, and from the northwest in the winter, northwest winds being predominant on an annual basis. Storm winds occur in all quadrants but are principally from the northwest, although storms from the easterly quadrant have the greatest effect on navigation. Fog signals in the area operate about 3 percent of the time from May to October inclusive. The mean and spring tidal ranges are 6.6 feet and 7.8 feet respectively and there is no appreciable tidal current in the harbor.

7. Milford Harbor is shown on United States Coast and Geodetic Survey Charts Nos. 219 and 1212, and on the map accompanying this report.

TRIBUTARY AREA

8. The tributary area served by this harbor is not large because of the close proximity of the improved commercial harbors of New Haven and Bridgeport. Although Milford is largely residential, there are a number of small industrial facilities producing metal goods, appliances, and novelties. Agriculture, oyster cultivation, and commercial production of seeds are other important activities. Milford has a population of about 43,000 (1959) which includes a large number of summer residents, occupying much of the ten mile ocean frontage.

9. The City and adjacent district is served by the four-track main line of the New York, New Haven and Hartford Railroad, and by U. S. Highway Route No. 1, the Merritt Parkway, the Connecticut Turnpike and a network of state roads.

BRIDGES AFFECTING NAVIGATION

10. No bridges cross the navigation channel of the Wepawaug River but a dam, two highway bridges and a railroad bridge cross the river at the head of navigation. A fixed highway bridge crosses the entrance between Gulf Pond immediately to the east of the harbor and the authorized East Basin. This bridge with a vertical clearance of 3 feet above mean high water and a horizontal clearance of 80 feet has been abandoned and a new highway bridge just east and upstream has been built with a horizontal clearance of 88 feet and a vertical clearance of 5.4 feet above mean high water.

PRIOR REPORTS

11. Since 1873 Milford Harbor has been the subject of 6 Federal studies. Prior to the adoption of the existing project, previous projects had provided 12 short jetties along the beach northeast of Welch's Point, at the eastern corner of the entrance to the outer harbor; the "long jetty" at the mouth of the Indian River; an auxiliary jetty parallel with the channel off Burns Point; and a dredged channel 8 feet deep across the bar which was later extended to above the town wharf with a depth of 4 feet. The most recent report was published in House Document No. 77, 75th Congress, 1st Session, and authorized the dredging of the anchorage west of the channel and present dimensions of the channel above Merwin's Wharf.

EXISTING CORPS OF ENGINEERS' PROJECT

12. The existing project was authorized by River and Harbor Acts of June 23, 1874, June 2, 1902 and August 26, 1937. The Act of June 23, 1874 authorized construction of a riprap jetty on the

east side of the entrance to the harbor. By departmental authorization dated October 16, 1879, the project was expanded to provide a riprap on the west side of the entrance. Both jetties were completed by 1880 to lengths of 510 and 250 feet on the east and west sides, respectively, of the entrance channel.

13. By the act of June 2, 1902, the project was modified to provide for an entrance channel 10 feet deep and 100 feet wide from Long Island Sound to Merwin's Wharf, thence 6 feet deep and 90 feet wide to the head of the harbor above the City Wharf, and an anchorage basin 10 feet deep and about 6 acres in area, adjacent to the east limits of the channel and just north of the east jetty. These authorized channels were completed to just above the City Wharf and 2.3 acres of the 10 feet east anchorage was dredged by 1905, at which time further dredging in the anchorage area was said to be impractical due to the large amount of ledge encountered and the cost of its removal. In 1906, under departmental authority, a basin 6 feet deep and 1.6 acres in area was dredged on the west side of the channel opposite Merwin's Wharf to partly compensate for the reduction in the easterly anchorage area.

14. A review of reports made in 1936 recognized the need for additional anchorages and noted that the harbor had never had available the complete area for anchorage provided by the terms of the modification of 1902. Modification of the project was recommended to provide, in lieu of the existing 6-foot inner harbor channel, for a channel 8 feet deep and 100 feet wide from Merwin's Wharf to a point 400 feet above the City Wharf, suitably widened at the bends and at the upper end, and in lieu of the 6-foot west anchorage, an anchorage basin 2,000 feet long and 7.8 acres in area on the west side of the channel inside of the entrance with depths of 10 feet in the lower 600 feet (1.9 acres) and 8 feet above. The report did not, however, recommend abandonment of the undredged portion of the East Anchorage.

15. This recommended modification was adopted by the Act of August 26, 1937 subject to the condition that local interests contribute one-third of the initial cost but not to exceed \$15,500. Work on this modification was completed in 1939 at a cost of \$34,140 of which local interest contributed one-third or \$11,380. This local contribution was made in connection with the modification of the 1937 channel and west anchorage, and was not related to the east anchorage.

16. In summary, the existing project, adopted in 1874 and modified in 1879, 1902, and 1937 provides for the following:

a. A channel 10 feet deep, 100 feet wide through the lower harbor to Merwin's Wharf, thence 8 feet deep, 100 feet wide, widened at the upper end, to a point 400 feet above the City Wharf, a total distance of about 1.2 miles.

b. An anchorage basin west of the channel inside of the entrance 2,000 feet long and 7.8 acres in area, 10 feet deep in the lower 600 feet (1.9 acres) and 8 feet deep above.

c. An anchorage basin, 10 feet deep and about 6 acres in area, east of the channel and north of the east jetty.

d. Two riprap jetties at the entrance of the river, the east jetty being 510 feet long and with a height of 4 feet above mean high water and the west jetty being 250 feet long with a height of one foot above mean high water.

17. The existing project is completed except for the 10-foot east anchorage basin which until now has been in an inactive status and undredged because of a reported large amount of ledge encountered. Total expenditures through June 1958 by the United States for the improvement of Milford Harbor were \$42,300 for previous projects and \$46,400 for the existing project. In addition \$11,400 was expended from contributed funds for new work. Maintenance costs have been \$167,000. The latest (1955) approved estimate for annual cost of maintenance is \$4,800.

LOCAL COOPERATION ON EXISTING AND PRIOR PROJECTS

18. No conditions of local cooperation were prescribed in connection with Federal projects for improvement of Milford Harbor prior to 1936. The 1937 modification was adopted subject to the condition that local interests contribute one-third of the initial cost but not to exceed \$15,500; provide and maintain a public landing; and furnish free of cost to the United States, suitable spoil disposal areas for new work and for subsequent maintenance when and as required. All these requirements were fully complied with. Spoil disposal areas for maintenance were furnished for the most recent harbor maintenance in 1956.

OTHER IMPROVEMENTS

19. Local interests participated in dredging an experimental cut through the outer bar in 1880 and have provided landing and mooring facilities. No other known improvements have been accomplished by local interests for the benefit of general navigation.

20. The Milford Biological Laboratory of the United States Fish and Wildlife Service in 1952, dredged a small basin of about

0.4 acre to a depth of 8 feet below mean low water adjacent to the 10-foot west anchorage.

TERMINAL AND TRANSFER FACILITIES

21. There are three bulkhead wharves near the river entrance, with a combined berthing space of 470 feet, that are used by the oyster industry. The City Wharf is located near the head of navigation, and provides a frontage of 60 feet open to public use on equal terms. Unloading equipment was dismantled years ago due to the lack of any water-borne commerce moving over the wharf. The laboratory of the United States Fish and Wildlife Service, (Shellfish Division) serving the shellfish interests from Maine to the Chesapeake is located in Milford Harbor at an 80-foot dock located on the west side of the inner harbor. The Milford Yacht Club maintains a pier and landing at Burns Point just at the mouth of the river where fuel and water are available. There are several additional private yacht landings and piers located on the river with repair and overhaul yards capable of hauling out craft up to 150 feet in length with drafts of 10 feet. The wharves are served by town highways.

22. In addition to the above facilities, a marina was constructed in 1959 south of the City Wharf. This facility provides finger piers with berth depths of 8 feet at mean low water that accommodates some 52 average size pleasure craft. Fuel and water facilities are also available at the marina.

IMPROVEMENT DESIRED

23. In order to obtain the views of interested parties with respect to improvement of Milford Harbor, a public hearing was held in Milford, Connecticut on November 3, 1955. The hearing was attended by a total of 67 people of which about one-third participated in the discussion in some degree. Among those present were a United States Congressman, and Representatives of the Federal Government, the State of Connecticut, the City of Milford, commercial fishing, oyster cultivation, yachting interests, and other business interests. The chief concern of all participants, without exception, was the need for more protection in the form of breakwaters, completion of the east anchorage, and provision of other convenient additional anchorage basins. The existing channel width and depth are apparently ample for the present navigation, except for the expression by an oyster firm of a desire for an increase in channel depth from 10 feet to 12 feet up to Merwin's Wharf as advance maintenance.

24. A representative of the U. S. Fish and Wildlife Service expressed a desire to have their individually dredged basin with an area of about 0.4 acre, included in the existing project for future maintenance by the Corps of Engineers, to a depth of 8 feet.

Their basin and dock is located on the west side of Milford Harbor just north of the Milford Yacht Club.

25. The Chairman of the Harbor Development Commission presented a plan of improvement for the harbor which had been presented to the members of Milford City Council and unanimously approved by the Harbor Development Commission. The recommendations fall into two categories, namely, immediate and long range. Under the immediate, the first priority is to have the existing jetties raised 3 or 4 feet to give protection from southerly storms. The first priority for new dredging was recommended as the east basin of the existing project, which in his opinion contains only cobble instead of ledge, the reason stated for failure to complete the anchorage in 1905. Another recommendation for anchorage space was in the Wilcox Park area directly opposite the City Dock which is under consideration for development of a marina. This development would run for approximately 600 feet parallel to the present channel. The Harbor Development Commission proposes granting a license to private interests to construct and operate a marina in this area, the ownership to revert to the Town in a stated number of years. By construction of bulkhead and finger piers, it was estimated that 140 average size boats could be accommodated. Another substantial area could be redeemed and made available to boating through the dredging from City Dock down the west side of the harbor. Private interests stand ready to develop marina facilities at this point as space for the boats becomes available. Nicholas Boat Yards presented plans for a proposed marina in this area that would accommodate over 60 boats. It was further recommended to extend the harbor line to the existing east and west jetties. The long-range plan recommended that a study be made of the cost and feasibility of a riprap jetty from Charles Island to Welch's Point, with suitable entrance passages to provide a mile square outer harbor.

26. A member of the Milford Planning and Zoning Board presented their proposals for improvement by further dredging of the east basin near the entrance to the harbor, further raising of the breakwaters and further widening and developing of the channel and anchorage opposite the City Dock.

27. The Manager of the Northern Oyster Company (formerly the Cedar Island Oyster Company) agrees with the improvements recommended by the Harbor Development Commission, but further suggests that consideration be given to making the channel 12 feet deep instead of 10 feet from the entrance up to Merwin's Wharf as advance maintenance. He stated they operated a boat that drew 10 feet and found that they lost so much time coming in and out and grounding three or four times a month, that it wasn't economical to operate this vessel any more.

28. A representative of the U. S. Coast Guard Auxiliary, Flotilla 713, stressed the importance of Milford Harbor as a harbor of refuge, and the fact that there is at present no room for additional boats in Milford Harbor.

29. Mr. Orlando Bradley, a representative of the boatyards above the City Dock was in agreement with all the improvements recommended by the Harbor Development Commission and further suggested the possibility of a good basin above the upstream limits of the existing project. Some boats have been anchoring in this area in the past but the ground is said to be no good for holding the boats without some dredging.

30. There was one letter presented in opposition to the improvement by Mr. C. F. Mower. He stressed the need for emergency dredging due to the recent floods, rather than any recreational improvements, which would tie up available dredging equipment and leave none available for emergency flood control dredging.

31. The Gulf Pond Basin, through which the Indian River has its access to the harbor, was discussed as a possibility for pleasure boating, and also as an anchorage basin, although it was pointed out that the new fixed highway bridge across its mouth with a horizontal clearance of 88 feet and a vertical clearance of 5.4 feet above mean high water would limit its use to outboards or other small craft. The old bridge adjacent and immediately downstream, with horizontal and vertical clearances of 80 and 3 feet, respectively, was never removed from the channel.

EXISTING AND PROSPECTIVE COMMERCE

32. Water-borne commerce has been curtailed considerably in Milford Harbor since the early thirties, largely because of the close proximity of the improved commercial harbors of New Haven and Bridgeport which both have deep channels and modern facilities for landing cargo. The reported oyster business has gradually declined from over 20,000 tons annually in the thirties to an average of 10,000 tons annually during the period 1949 through 1953. The tonnages reported in the last 5 years for which figures are available consist of shellfish and fresh fish as follows:

1954	2,797
1955	1,411
1956	3,891
1957	6,005
1958	3,188

VESSEL TRAFFIC

33. There are less than a dozen oyster boats that operate out of the harbor, five days a week, year round, weather permitting. The majority of these boats are under 75 feet in length and their maximum draft is under 12 feet. The vessel trips reported in the last 5 years for which figures are available are as follows:

<u>Year</u>	<u>Vessel Trips</u>
1954	1,502
1955	1,280
1956	1,789
1957	1,996
1958	2,090

34. In addition to the above, there are the local yacht club fleets of power and sailboats which make numerous trips into and out of the harbor during the summer season. These boats number about 350, ranging in length from 12 to 53 feet. There are about 75 cruisers and auxiliary sailboats that draw an estimated 6 to 8 feet, and the remainder draw less than 6 feet. Each of four clubs reporting had at least 50 inquiries for space last year which had to be refused for lack of mooring space. Yachts from other ports frequently visit the harbor, and during regattas it is estimated there have been over 100 extra pleasure craft in the harbor. The U. S. Fish and Wildlife Service has a boat 50 feet in length with a draft of 5 feet, and also, the State Shellfish Commission, has a boat that operates out of this harbor. No record is kept of the movement of the non-commercial fleet.

DIFFICULTIES ATTENDING NAVIGATION

35. The principle difficulties attending navigation in Milford Harbor are stated to be the lack of protection by the jetties from southerly storm waves, and inadequate anchorage space with the resultant necessity of using undesirable methods of mooring with short scope of anchor chain and fore and aft mooring and also the necessity of turning away boats desiring mooring space.

36. The existing jetties are reported to give little or no protection to the harbor at times of high tide and southerly storms, at which time they become completely submerged, and the waves roll in unaffected. Both jetties were reported to have been almost completely submerged on five occasions in the six weeks prior to the hearing. Large waves that are dangerous to small boats sweep into the harbor frequently and reduce its suitability as a small boat harbor. An oyster boat over 70 feet long was badly damaged right at her dock in the November 1950 blow from the southeast.

37. One oyster company reported using an oyster boat of about 10-foot draft in which they had numerous cases of groundings to such an extent, they discontinued using it. Other oyster boats of about 8 feet light draft, when laden get mud in their motors, but do not actually ground out. There were reported instances of a Coast Guard vessel and a dredge getting stuck in the mud. Some of these difficulties, due to a lack of depth, have no doubt lessened since the recent maintenance dredging to project depths.

WATERPOWER AND OTHER SPECIAL SUBJECTS

38. There are no matters of flood control, water power or pollution pertinent to this report. The U. S. Fish and Wildlife Service has indicated that dredging in Milford Harbor would affect fish and wildlife as follows (Appendix B contains the full text of their report):

"The shellfish habitat of Milford Harbor consists largely of seed oyster-producing estuarine areas of high potential value but presently in poor condition. This situation is chiefly due to two factors. In the deeper water, siltation has reduced habitat quality for oyster production. In the shallower, intertidal areas, siltation is not a factor. Since these areas are unmanaged and unregulated however, oyster populations have been reduced to remnant proportions. There is some expectation that the latter condition may eventually be corrected, but correction of the siltation problem in the deeper areas is a very long-range prospect at best. Therefore, the net result of the proposed dredging will be an increase in the deeper habitat with the most difficult problems of restoration and a reduction in the shallow, intertidal habitat, most susceptible of future improvement. Expression of this net loss to future oyster restoration potentials in quantitative terms, particularly in monetary terms, would require a considerable amount of detailed study. Since our most recent investigations have determined that mitigation measures are not feasible, detailed estimation of this loss to future restoration potentials is not considered warranted.

"Damages to the locally significant wetlands areas could be avoided if alternate spoil disposal sites were available at approximately comparable costs.

"It is concluded:

- (1) That the proposed improvement will not have direct unfavorable effects on the Milford Biological Laboratory of the Bureau of Commercial Fisheries and may have some beneficial effects through improvement of quality of water used by the Laboratory.

- (2) That the proposed improvement will reduce the potential of Milford Harbor for future restoration of a seed oyster-producing resource. This loss cannot be mitigated.
- (3) That damages to the locally significant wetlands habitat could be avoided if alternate spoil disposal sites can be made available at approximately comparable costs."

PLAN OF IMPROVEMENT

39. Breakwaters. - The inner harbor is landlocked except its entrance from the outer harbor which is sheltered from all but southerly storms. The prevailing winds are from the south through the northwest in the summer and from the northwest in the winter, northwest winds being predominant on an annual basis. Southeast storms have the greatest effect on navigation but occur less frequently. Consideration has been given to raising the jetties. The west jetty project height is about 7 feet above mean low water. Due to the position and angle of this jetty to the damaging waves, it is thought very little, if any, reduction in wave action in the harbor would accrue from raising this jetty. The east jetty, which provides substantial protection to the lower harbor, has a project height of 10.5 feet above mean low water and has a length of 510 feet from shore. Consideration was given to raising this jetty above the present project height but it was found that a jetty to project height would protect the lower harbor during all storms except hurricanes. The lower harbor is exposed to waves from the south through the 300-foot opening between the jetties which make it unsafe for small boats during severe storms. Additional protection could be provided by reducing the opening but this would make normal navigation more difficult and result in greater vessel damages. Raising the east jetty would not substantially affect the wave action in the harbor, but it is considered that the loss of the existing jetty would result in substantially increased damages. It is therefore considered that the existing jetty should be maintained, but not extended or raised.

40. East Basin. - This basin was partially dredged in 1905, at which time further dredging in the area was said to be impractical due to ledge rock being encountered. The area of completed dredging was 2.3 acres of the authorized 6 acres. Local interests have requested completion of this anchorage basin which lies just east of the channel and inside the east jetty. Recent field investigations indicate that earlier reports of ledge in the area are not valid, and that dredging of the entire project area would be practicable, although the material is hard, possibly with some boulders. The great need for an anchorage basin in this area as expressed at the hearing apparently indicates that this is the most desired of all the anchorage areas. Although a 10-foot depth is authorized in this area consideration of the present navigation indicates

that a depth of 8 feet would be sufficient to meet present needs. A separate study is underway of the economic justification for reactivation of this project feature and construction of the East Basin to a depth of 8 feet.

41. A plan of improvement has been considered in this navigation review report to provide additional anchorage of about 8.5 acres on the west side of the channel extending south from City Wharf along the western side of the harbor. In view of the large number of craft that require less than 6 feet of depth this anchorage would be dredged to 6 feet below mean low water.

42. There is a natural small bay located opposite the City Wharf which was proposed for consideration as a marina. This area extends for a distance of about 600 feet south from the upstream end of the existing project. The City officials proposed, at the time of the hearing, to lease this site shoreward of the harbor line to private interests to develop a marina with depths of about 8 feet, which would accommodate an estimated 140 pleasure craft. To date it does not appear that this development will proceed. Because much of this area is shoreward of the harbor line and since the improvement planned would require construction of a marina facilities it is considered that Federal interest in dredging in this area would be limited.

43. Upstream Extension of Existing Project. - Improvement of Wepawaug River above the existing project to provide a mooring basin of about one acre for small pleasure craft to a depth of 6 feet was also considered. This basin would be limited in width by the existing shore and harbor lines and limited in usefulness by the need for a fairway. Because of these restrictions no further consideration was given this area.

44. Channel Deepening. - Although consideration was given to deepening the outer channel, up to Merwin's Wharf from 10 feet to 12 feet deep, the claims by local navigation interests of damages do not appear to be of sufficient severity and extent to warrant the additional cost of channel deepening. Vessels with a draft of 10 feet or more have largely been replaced by shallower draft vessels in the oyster industry and no pleasure craft are reported to be having difficulty in the existing 10-foot channel where it is maintained to that depth.

45. Outer Harbor Feasibility. - It was recommended by local interests that a study be made of the cost and feasibility of a riprap jetty from Charles Island to Welchs Point, with suitable entrance passages. The resulting enclosures would be over a mile square and would furnish a harbor of refuge for Long Island Sound boating. An additional benefit would be the controlling effect on erosion of over a mile of Milford's most valuable shore line, which was evacuated three times in 1955. However, this would require a breakwater over a mile long from Charles Island northeastward to Welchs Point in water 18 feet deep for most of

the distance, and would require building up the bar leading northwest from the island to shore, a distance of about 3,000 feet. This improvement would cost in excess of 4 million dollars. Although this project is physically possible from an engineering standpoint and might be desirable from a navigational point of view, it is not considered that the benefits of an outer harbor would, in any sense, be commensurate with the cost.

46. Fish and Wildlife Service Basin. - Most of the basin dredged by the U. S. Fish and Wildlife Service lies shoreward of the Harbor Line. The Corps of Engineers has no authority to dredge shoreward of the Harbor Line, nor can the Corps assume maintenance of another agency's berth. Maintenance dredging of this area is considered to be the responsibility of the U. S. Fish and Wildlife Service and could be negotiated by them to best advantage at the time other dredging is being done in the area.

47. Gulf Pond Area. - The Indian River (Gulf Pond) is crossed at the mouth by two fixed highway bridges with horizontal clearances of 80 and 88 feet and vertical clearances of 3 and 5.4 feet respectively above mean high water. Navigation in the Pond is limited to very small craft at about half tide or higher, and at low water it is largely exposed flats where clams are dug. Navigation improvement is not considered feasible in this area, in view of the high cost of bridge alterations and of dredging that would be required.

48. Summary. - The plan of improvement selected as a result of the above considerations would provide for provision of an additional 8.5 acres of anchorage 6 feet deep on the west side of the harbor. This plan was discussed with local officials and approved by them.

SHORE LINE CHANGES

49. The plan of improvement involves dredging an anchorage area within the enclosed inner harbor. It is not considered that this work would have any significant effect on the adjacent shore lines.

REQUIRED AIDS TO NAVIGATION

50. No additional aids to navigation are contemplated since the existing entrance channel is well marked with buoys, and the harbor light is strategically located on the west end of the east jetty. The proposed improvements are within the landlocked harbor and river and navigation therein can be done safely by reference to the adjoining topography. The U. S. Coast Guard has been consulted and has indicated that no additional aids to navigation would be required for the proposed improvement.

ESTIMATES OF FIRST COST

51. Probings and soundings were made in a hydrographic survey of the areas of contemplated improvements to determine the relative hardness of material to be dredged and the existence and extent of submerged rock areas. The proposed dredging would be of ordinary material, consisting of mud, sand and gravel. The cost estimate provides for dredging to the proposed project depth plus an allowance of one foot for overdepth, with side slopes of 1 vertical on 3 horizontal. The costs include an allowance for contingencies and are based on prices prevailing in July 1960 with removal of material by contract dredging. The estimate is based on use of a hydraulic dredge. The cost of providing the additional 8.5 acre anchorage, 6 feet deep, on the west side of the harbor is:

West Basin

Dredging 8.5 acres, 6 feet deep	\$190,000
Preauthorization Studies	7,000
Engineering and Design	6,000
Supervision and Administration	24,000
Total (July 1960)	<u>\$227,000</u>

52. In addition, the Fish and Wildlife Service has advised that the improvement will reduce the potential for future restoration of a seed oyster-producing resource, and spoil disposal on marshland will damage locally significant wetlands areas. These losses cannot be expressed in monetary terms.

ESTIMATES OF BENEFITS

53. Benefits have been evaluated independently for completion of the East Basin and construction of additional anchorage on the west side of the harbor. The benefits used in the proposed project modification are the net benefits above and beyond those that would result from completion of the present project. The increased anchorage would result in tangible benefits to recreational craft from reduction of inconveniences and damages caused by too close mooring at present, or even after the existing project is completed, and from increased use of the fleet and new boats added if the west anchorage is enlarged. Additional benefits will accrue from use of spoil from the harbor for land enhancement.

54. At present about 350 recreational craft, 8 commercial fishing, and 2 Governmental craft are based in the harbor. Even after allowances are made for boats away from the harbor, at private docks or kept on shore, many boats must anchor in the channel. Construction of the East Basin within existing project authorization would provide an additional 6 acres of anchorage and benefit the existing fleet by reduction of congestion and reducing the need to anchor in the channel.

55. The benefit accruing to the existing pleasure fleet is considered to be the increased annual net return of the boats to their owners. The annual net return to the owners has been taken as the

amount the owners would receive if they chartered to others, this amount having been computed at various percentages of the present depreciated boat value for various classes of boats, in accordance with available studies of boating practice. In view of the present congestion in the harbor it is considered that the owners now receive only about 70 percent of the return possible under ideal conditions. It is estimated that construction of the East Basin would increase the return to about 85 percent of that possible under ideal conditions. It is not considered that completion of the East Basin would reduce congestion sufficiently to attract additional craft to the harbor or provide any tangible benefit to the commercial and Governmental craft based in the harbor.

56. Additional benefits to the owners of the existing recreational fleet would result from modification of the existing project by provision of additional anchorage. An additional 8.5 acres of anchorage would eliminate the necessity of mooring in the channel, reduce the density of craft in the harbor and permit about 50 new craft to base in the harbor. Under these circumstances it is estimated that owners of recreational craft could receive about 90 percent of the return possible under ideal conditions rather than the 85 percent of ideal return that would be realized upon completion of the existing project. Benefits to the existing fleet are evaluated in Table I as \$3,400.

57. Each of the 4 boat yards have had at least 50 inquiries for space which they have had to refuse for lack of mooring space. The completion of the proposed anchorage there would allow 50 additional craft and still give more spacious accommodations to the existing fleet. Because of the crowded conditions in other harbors in the area it is considered that any boats transferred would result in new craft at their old harbor. The 50 boats added to the Milford fleet would either be new craft or result in the purchase of new craft. The composition of the new fleet has been estimated on the basis of the composition of the existing fleet. The gain to the new boats has been estimated to be the total percent return which may be expected by the owners at Milford Harbor. The net benefits to the new pleasure fleet have been estimated in Table II to amount to \$11,600 annually.

TABLE I NET BENEFITS TO EXISTING LOCALLY BASED FLEET
Because of Additional Improvement
(Assuming and After Completion of the Existing Fleet)

Type of Craft	Length (Feet)	No. of Boats	Depreciated Value		Percent Return			Gain	Value \$	On Cruise (180-Day Season)		
			Average \$	Total \$	Ideal	% of Ideal				Avg Days	% of Season	Value \$
						Pres.	Future					
Outboards	12-29	100	300	30,000	11	85	90	0.6	180			
Inboards	18-38	90	600	54,000	10	85	90	0.5	270			
Cruisers	20-53	73	6,000	438,000	9	85	90	0.4	2,150	15	8.3	180
Aux. Sail	50-53	2	20,000	40,000	9	85	90	0.4	160	18	10	20
Sailboats	12-42	82	2,000	164,000	10	85	90	0.5	820	9	5	40
Totals		347		726,000				Say 3,600				Say 200
									Net Benefit = \$3,400			

TABLE II BENEFITS TO NEW BOATS ADDED BECAUSE OF ADDITIONAL IMPROVEMENT

Outboards	10-20	15	400	6,000	11	0	90	9.9	590			
Inboards	10-20	14	800	11,000	10	0	90	9.0	990			
Cruisers	20-50	10	8,000	80,000	9	0	90	8.1	6,480	15	8.3	540
Aux. Sail	41-60	1	20,000	20,000	9	0	90	8.1	1,620	18	10	160
Sailboats	12-40	10	3,000	30,000	10	0	90	9.0	2,700	9	5	130
Totals		50		147,000				Say \$12,400				Say \$800
									Net Benefit = \$11,600			

58. It is not considered that the commercial fishing or governmental craft would receive any substantial benefit from construction of the additional west anchorage.

59. Disposal of material from the additional anchorage on nearby undeveloped lands would make possible the enhancement of the value of about 10 acres of land in the inner harbor or 11 acres of land in an alternate area inshore of Gulf Beach in Indian River as shown on the accompanying maps. It is estimated that undeveloped land in both these areas are now worth \$500 per acre and would appreciate to \$2,500 per acre if filled. The additional value of \$2,000 per acre is less than the cost of fill material from ordinary sources. The cost of diking is estimated at \$4,000 for each area. There would be an additional dredging cost, estimated at \$2,000, if the area behind Gulf Beach is used because of the increased length of pipe line required. The value of spoil in the inner harbor area would yield a net value of \$16,000 (\$20,000 for 10 areas less \$4,000 for diking). The net value of spoil on the outside area would also be \$16,000 (\$22,000 for 11 area less \$4,000 for diking and \$2,000 for increased pipeline costs). The annual benefits from land enhancement in either case, computed at a 5% annual return, is therefore \$800.

60. The tangible benefits from construction of an additional 8.5 acres of anchorage, 6 feet deep are summarized below:

	<u>General</u>	<u>Local</u>	<u>Total</u>
Recreational Boating			
Existing Fleet	\$1,700	\$1,700	\$3,400
New Boats	5,800	5,800	11,600
Land Enhancement	400	400	800
Total	<u>\$7,900</u>	<u>\$7,900</u>	<u>\$15,800</u>
Percent of Total	50%	50%	100%

ESTIMATES OF ANNUAL CHARGES

61. Annual charges for construction of additional anchorage west of the channel are based on an interest rate of 2.5 percent for Federal, 3.5 percent for non-Federal investment, and a project life of 50 years. In view of the local benefits, a non-Federal investment of 50 percent of the construction cost has been used. The additional annual maintenance for this area is based on a shoaling rate of 1,000 cubic yards per year.

Federal Investment	
Construction (\$220,000) (.50)	\$110,000
Preauthorization Studies	7,000
	<u>\$117,000</u>
Non-Federal Investment	
Cash Contribution (\$220,000) (.50)	\$110,000
Federal Annual Charges	
Interest (\$117,000) (.025)	\$2,900
Amortization (\$117,000) (.01026)	1,200
Additional Maintenance	2,000
Total Federal	<u>\$6,100</u>
Non-Federal Annual Charges	
Interest (\$110,000) (.035)	\$3,900
Amortization (\$110,000) (.00763)	800
Total Non-Federal	<u>\$4,700</u>
Total Annual Charges	\$10,800

COMPARISON OF BENEFITS TO COST

62. The 8.5 acres of additional anchorage, 6 feet deep, west of the channel, with an estimated annual benefit of \$15,800 and the estimated annual carrying charges of \$10,800, results in a benefit-cost ratio of 1.5.

PROPOSED LOCAL COOPERATION

63. The benefits to be derived from modification of the existing project are recreational and land enhancement benefits which are considered to be 50 percent local and 50 percent general in nature. The apportionment of costs between the United States and local interests, based on the percentage of local benefits applied to project first costs, requires that local interests make a cash contribution of 50 percent of the cost of construction of the proposed project modification. This local cash contribution is presently estimated at \$110,000.

64. Local interests should also be required to hold and save the United States free from damages due to the construction and maintenance of the proposed project modification, and provide without cost to the United States all necessary lands, easements, and rights-of-way for the construction and maintenance of the project modification when and as required. The proposed enlargement to the West Anchorage is suitably located for disposal of material by the hydraulic process. Undeveloped areas are available near the harbor and would result in a land enhancement benefit from development by filling. It is therefore considered that local interests should be required to provide spoil disposal areas

for this improvement. Local interests have provided adequate facilities and a public landing open to all on equal terms as part of the required local cooperation for the existing project. The City of Milford regulates the use, growth and free development of the harbor facilities. Because the public facilities are adequate and there is a competent and properly constituted body which ensures that the harbor facilities are open to all on equal terms it is considered that further requirements of local cooperation of this nature are not necessary.

65. Local officials have been consulted on the plan of improvement and the above requirements of local cooperation. The City Council, the Mayor, and the Chairman of the Harbor Development Commission have approved the plan and indicated that the necessary assurances would be provided when required.

APPORTIONMENT OF COSTS AMONG INTERESTS

66. Local interests should bear a portion of the cost of the proposed project modification commensurate with the local benefits realized from the improvement. The apportionment of costs between the United States and local interests is made so that the Federal and non-Federal share of the project construction costs are in the same ratio as the evaluated general and local benefits. Of the initial construction cost of \$220,000, local interests should make a cash contribution of 50 percent (\$110,000). The Federal costs, including \$7,000 for preauthorization studies would be \$117,000.

COORDINATION WITH OTHER AGENCIES

67. All Federal, State and local agencies having interest in the improvement of Milford Harbor were notified of the public hearing at Milford, Connecticut on November 3, 1955. Representatives of the U. S. Fish and Wildlife and the State of Connecticut, City officials, oyster fishermen and other local interests have all been consulted during the study concerning the proposed improvements affecting their activities. The U. S. Fish and Wildlife Service has reported (see Appendix B) that dredging will result in loss of a potential for future restoration of a seed-oyster producing resource, and that spoil disposal on marsh areas will damage a locally significant waterfowl wetlands habitat. Their report is discussed below under Conclusions. Local officials have approved the plan of improvement and indicated that the requirements of local cooperation would be met.

DISCUSSION

68. Milford Harbor is located about midway between the larger harbors of New Haven and Bridgeport, Connecticut, on the north shore of Long Island Sound, about 67 miles east of New York City. The harbor comprises an outer bay about a mile square and the tidal and navigable portion of Wepawaug River, nearly a mile long.

69. The history of Federal improvement of Milford Harbor dates back to 1873. The existing project authorized by the River and Harbor Act of June 23, 1874, and by subsequent acts, provides a channel 100 feet wide and 10 feet deep up to Merwin's Wharf and 8 feet deep in the upper reach which extends 400 feet above the City Wharf, 8 and 10-foot anchorages east and west of the channel, and two riprap jetties at the entrance of the river. At a public hearing on November 3, 1955, local interests expressed a desire for improvement of the jetties for greater protection and expansion of the pleasure boating facilities by providing additional anchorage space to take care of the great demand in the vicinity of Milford Harbor.

70. The City of Milford is largely residential although there are a number of small industrial facilities in the vicinity. Waterborne commerce has been curtailed considerably in Milford Harbor since the early thirties, largely because of the close proximity of the improved commercial harbors of Bridgeport and New Haven. The oyster business, the only commerce reported in recent years, has gradually declined from over 20,000 tons annually in the thirties to an average of 10,000 tons annually from 1949 through 1953, and much less in the more recent years. Of the eight known oyster boats using the harbor, none have a draft greater than the 10-foot existing channel. Most of the pleasure craft using the harbor are of shallow draft and have no difficulty with respect to harbor depth, although there is a crowded condition that makes navigation very difficult, and unsafe at times.

71. The plan of improvement that would best meet the needs of navigation and crowded condition in the harbor, in addition to or after completion of the existing project by dredging of the 6-acre East Basin to a depth of 8 feet is provision of an additional anchorage area below the City Wharf. This new area would provide 8.5 acres of anchorage to a depth of 6 feet. There are 347 pleasure craft, 8 oyster fishing boats, and two Government-owned vessels utilizing the harbor at the present time. With the proposed improved anchorage it is considered that an estimated 400 craft could be accommodated in the harbor. These improvements would reduce hazards and congestion of the existing fleet and permit an estimated 50 additional pleasure boats to be added to the local fleet.

72. Modification of the existing project to provide an additional 8.5 acres 6 feet deep is estimated to cost \$227,000 (July 1960). This anchorage would reduce congestion in the harbor from that now existing or that would still exist even after completion of the existing project and at the same time permit the addition of 50 new recreational craft to the local fleet. Since the benefits, estimated at \$15,800 would accrue to recreational boats and from land enhancement they are 50 percent local in nature and local interests should be required to make a cash contribution of 50 percent of the construction cost. The local costs would therefore be \$110,000; while the Federal costs would be

\$117,000 for construction and preauthorization studies, plus annual maintenance estimated at \$2,000. With annual charges of \$10,800 this modification has a benefit-cost ratio of 1.5.

73. The terms of local cooperation for the proposed project modification require that local interests make a cash contribution of 50 percent of the construction cost, hold the United States free from damages, and provide all necessary lands, easements, rights-of-way and spoil disposal areas. Local officials have been consulted and have approved the plan and indicated that these requirements of local cooperation would be met.

74. The U. S. Fish and Wildlife Service has been consulted concerning the effect of the proposed improvement on fish and wildlife. Their report is given in full in Appendix B. They indicate that dredging will result in a loss of a potential for future restoration of a seed-oyster producing resource, that this loss cannot be mitigated, but that evaluation of the economic value of this loss is not considered warranted. It is not considered that this loss would outweigh the estimated annual benefits resulting from the navigation improvement.

75. The Fish and Wildlife Service has also reported that spoil disposal on marshlands adjacent to the harbor will eliminate some small wetlands areas that are now of local significance to waterfowl and that these damages could be avoided if alternate spoil disposal sites were available at approximately comparable costs. Consideration has been given to the possibility of using alternate spoil disposal areas and it appears that (a) spoil from the improvement could be hydraulically placed either on marshlands west of the harbor or on marshlands back of Gulf Beach without changing project costs or benefits, (b) adequate land areas that are not wetlands are not available, and (c) the cost to dispose of spoil from harbor improvement by bucket dredge and scow to deep water in Long Island Sound would be substantially greater (about \$25,000 more) than by hydraulic dredge and disposal on shore. It is also noted that the computed land enhancement value of \$16,000 would not result if the spoil is dumped at sea.

76. In view of the above it is considered that the elimination of the use of this area by waterfowl is outweighed by the benefit from filling and the economic advantage of spoil disposal on land rather than at sea. Therefore it does not appear that damages to the locally significant wetlands areas can be avoided. The Fish and Wildlife Service concurs with this conclusion.

77. Additional information on recommended and alternative projects called for by Senate Resolution 148, 85th Congress, 1st Session adopted 28 January 1958 is contained in attachment to this report.

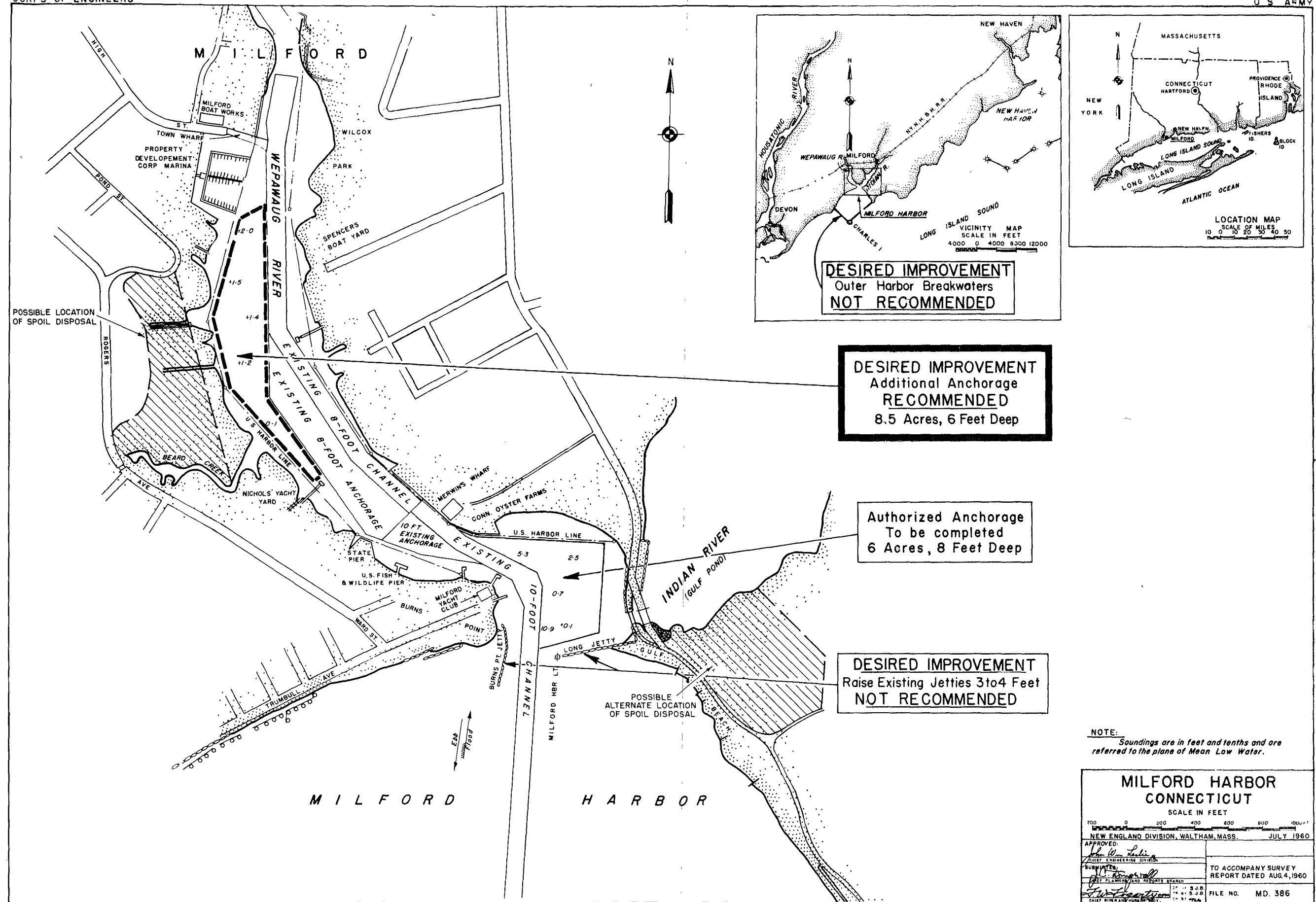
78. The presently authorized project even upon completion does not provide sufficient anchorage area. Modification of the existing project to provide an additional 8.5 acres of anchorage 6 feet deep on the west side of the inner harbor south of the City Wharf would meet present and reasonably prospective needs of navigation and, with a benefit-cost ratio of 1.5, is justified. This improvement was approved by local officials, who are of the opinion the necessary requirements of local cooperation would be met.

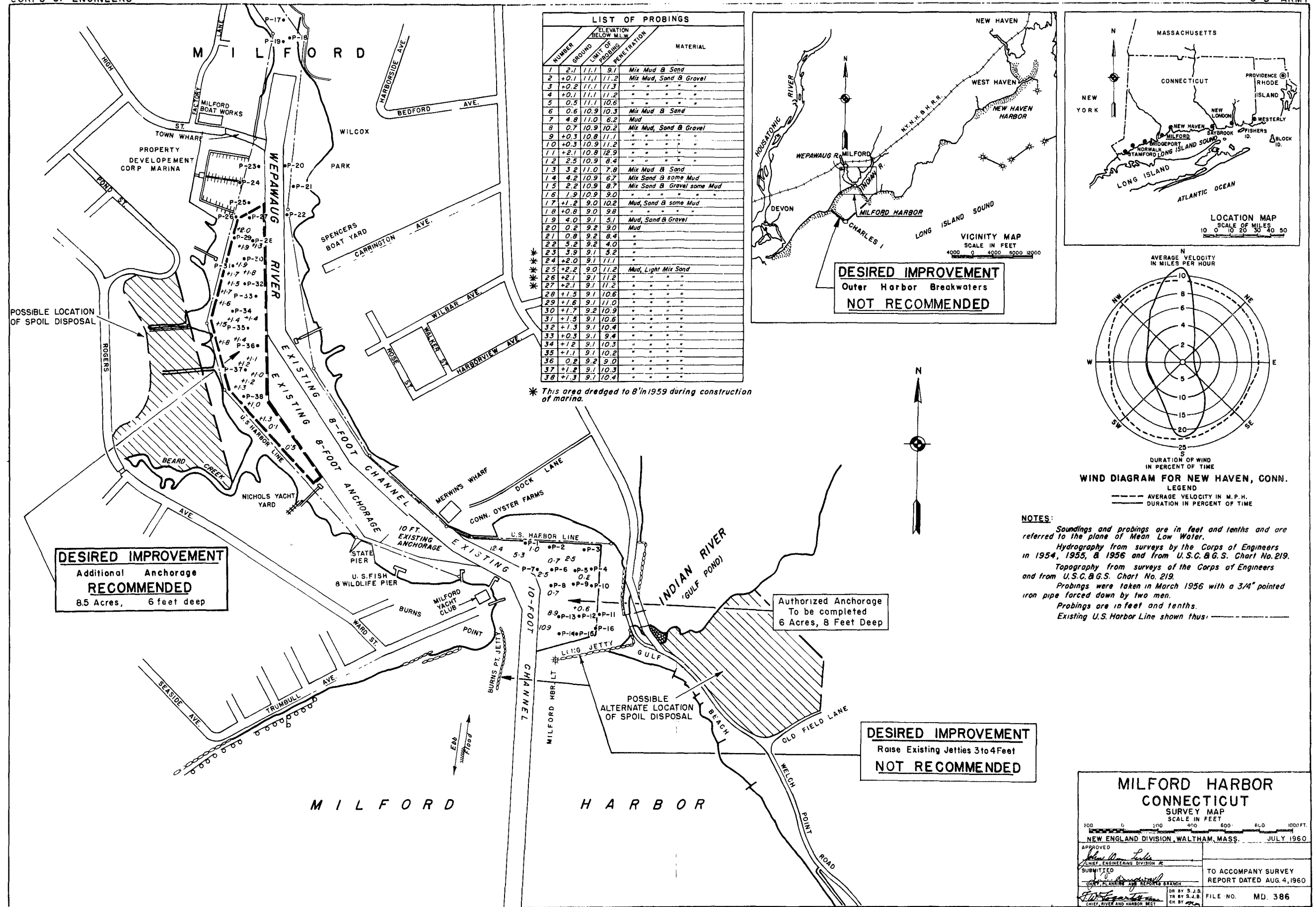
RECOMMENDATIONS

79. In view of the foregoing, the Division Engineer recommends modification of the existing project to provide 8.5 acres of anchorage on the west side of the harbor 6 feet deep, at a Federal cost of \$110,000 for construction, \$7,000 for preauthorization studies and \$2,000 annually for maintenance. This recommendation is made subject to the condition that local interests (a) contribute in cash prior to construction 50 percent of the construction cost of the project modification, the contribution now estimated at \$110,000 but the final determination to be made after completion of the work; (b) hold and save the United States free from damages from construction and maintenance of the project; (c) provide without cost to the United States all lands, easements, rights-of-way and spoil disposal areas necessary for construction and maintenance of the project.

- 4 Incl
- 1. Map - Plates 1 & 2
- 2. Appendix A - Estimate of First Cost
- 3. Appendix B - Fish & Wildlife Report
- 4. Sen. 148 Supplement

AIDEN K. SIBLEY
Brigadier General, U. S. Army
Division Engineer





APPENDIX A

MILFORD HARBOR, CONNECTICUT

Estimate of First Cost

1. The first cost of construction of the considered improvement has been estimated for the report. Federal construction consists of dredging of additional anchorage on the west side of the existing 8-foot channel with an area of 8.5 acres and a depth of 6 feet at mean low water.

2. Probings made during field surveys indicate that all proposed dredging would be of ordinary material, consisting of mud, sand and gravel. Dredging volumes are estimated in terms of in-place measurement and include an allowance of 1-foot for overdepth dredging and an allowance for side slopes of 1 vertical on 3 horizontal. Dredging costs are based on price levels prevailing in July 1960 and on use of a hydraulic dredge with spoil disposal on marsh lands.

3. The estimate of cost is detailed as follows:

Project Cost Estimate

(In Thousands of Dollars)

<u>Cost Acct. No.</u>	<u>Item</u>	<u>Cost Estimate (July 1960)*</u>
09	Channels	
	Dredging 6-foot West Anchorage, 8.5 acres (105,000 c.y. of sand, mud and gravel @ \$1.57)	165.0
	Contingencies @ 15%	25.0
29	Preauthorization Studies	7.0
30	Engineering and Design	6.0
31	Supervision and Administration	24.0
	Total Project Cost	227.0
	Total Federal Cost	117.0
	Non-Federal Cost	
	Cash Contribution	110.0
	Total Non-Federal Cost	110.0

* In thousands of dollars

MILFORD HARBOR, CONNECTICUT

APPENDIX B

U. S. Fish and Wildlife Service Report

By letters of 13 August and 23 September 1959 the Regional Director of the United States Fish and Wildlife Service was advised of the plan of improvement shown on the report map and requested to comment on the effect of the improvement on fish and wildlife. It was explained that about 100,000 yards of spoil would be dredged and local interest would probably offer 10-20 acres of marshland on the west bank of the Wepawaug River for spoil disposal. The full report of the Fish and Wildlife Service is reproduced on the following pages.



ADDRESS ONLY THE
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
59 TEMPLE PLACE
BOSTON, MASSACHUSETTS

NORTHEAST REGION
(REGION 3)
NEW ENGLAND STATES
NEW YORK
PENNSYLVANIA
NEW JERSEY
DELAWARE
WEST VIRGINIA

September 11, 1959

Division Engineer
New England Division
U.S. Corps of Engineers
424 Trapelo Road
Waltham 54, Massachusetts

Dear Sir:

Reference is made to Mr. Leslie's letter of August 13, 1959 on the Federal Navigation Improvement at Milford Harbor, Connecticut. We have investigated this project in cooperation with the Bureau of Commercial Fisheries, Gloucester, Massachusetts.

We conclude that the project will not have direct unfavorable effects on the Milford Shellfish Laboratory of the Bureau of Commercial Fisheries which is located close to the proposed improvement. Actually, a larger intertidal exchange of water brought about by the project may improve the quality of water used by this laboratory.

It is anticipated, however, that the project will have detrimental effects on fish and wildlife resources in the immediate area. The area to be dredged is, at present, a potential natural oyster bed and its destruction will still further handicap the possibilities of rehabilitation of the natural seed oyster-producing estuarine areas of Connecticut. Present spoil disposal plans will eliminate some small wetlands areas that are now of local significance to waterfowl.

Reduction of these detrimental fish and wildlife effects through project modifications is a possibility. We are investigating this possibility further and will report our findings to you at the earliest opportunity.

Sincerely yours,

M. A. Marston, Chief
Division of Technical Services



ADDRESS ONLY THE
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
59 TEMPLE PLACE
BOSTON, MASSACHUSETTS

NORTHEAST REGION
(REGION 5)
MAINE
NEW HAMPSHIRE
NEW YORK
VERMONT
PENNSYLVANIA
MASSACHUSETTS
NEW JERSEY
RHODE ISLAND
DELAWARE
CONNECTICUT
WEST VIRGINIA

November 6, 1959

Division Engineer
New England Division
U. S. Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts

Dear Sir:

This letter will supplement our September 11 comments on the Federal Navigation Improvement at Milford Harbor, Connecticut.

The shellfish habitat of Milford Harbor consists largely of seed oyster-producing estuarine areas of high potential value but presently in poor condition. This situation is chiefly due to two factors. In the deeper water, siltation has reduced habitat quality for oyster production. In the shallower, intertidal areas, siltation is not a factor. Since these areas are unmanaged and unregulated however, oyster populations have been reduced to remnant proportions. There is some expectation that the latter condition may eventually be corrected, but correction of the siltation problem in the deeper areas is a very long-range prospect at best. Therefore, the net result of the proposed dredging will be an increase in the deeper habitat with the most difficult problems of restoration and a reduction in the shallow, intertidal habitat, most susceptible of future improvement. Expression of this net loss to future oyster restoration potentials in quantitative terms, particularly in monetary terms, would require a considerable amount of detailed study. Since our most recent investigations have determined that mitigation measures are not feasible, detailed estimation of this loss to future restoration potentials is not considered warranted.

Damages to the locally significant wetlands areas could be avoided if alternate spoil disposal sites were available at approximately comparable costs.

It is concluded:

- (1) That the proposed improvement will not have direct unfavorable effects on the Milford Biological Laboratory of the Bureau of Commercial Fisheries and may have some beneficial effects through improvement of quality of water used by the Laboratory.
- (2) That the proposed improvement will reduce the potential of Milford Harbor for future restoration of a seed oyster-producing resource. This loss cannot be mitigated.
- (3) That damages to the locally significant wetlands habitat could be avoided if alternate spoil disposal sites can be made available at approximately comparable costs.

Sincerely yours,



M. A. Marston, Chief
Division of Technical Services



ADDRESS ONLY THE
REGIONAL DIRECTOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
59 TEMPLE PLACE
BOSTON, MASSACHUSETTS

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NEW JERSEY
RHODE ISLAND
DELAWARE
CONNECTICUT
WEST VIRGINIA

September 28, 1960

Division Engineer
New England Division
U.S. Corps of Engineers
424 Trapelo Road
Waltham, Mass.

Dear Sir:

We have considered the statements concerning the effects on fish and wildlife now proposed for your report on Milford Harbor.

We concur with your conclusion that the loss to the shellfish resources would not outweigh the benefits resulting from the navigation improvement.

We understand that you have found that (a) spoil from the improvement could be hydraulically placed either on marsh lands west of the harbor or on marsh lands back of Gulf Beach without changing project costs or benefits, (b) adequate land areas that are not wetlands are not available, and (c) the cost to dispose of spoil from harbor improvement by bucket dredge and scow to deep water in Long Island Sound would be substantially greater (about \$25,000 more) than by hydraulic dredge and disposal on shore. On that basis we concur with your conclusion that the loss of waterfowl habitat would not outweigh the economic advantage of spoil disposal on land.

The fish and wildlife losses cannot be expressed in monetary terms. However, they are economic costs resulting from the project. We recommend inclusion of a statement of loss in the cost section of the report.

Sincerely yours,

E. W. Bailey
Acting Regional Director

MILFORD HARBOR, CONNECTICUT
(Survey Report Dated 4 August 1960)

Information Called for by
Senate Resolution 1148, 85th Congress
Adopted 28 January 1958

1. Navigation Problem: Milford Harbor, in Connecticut on the north shore of Long Island Sound between Bridgeport and New Haven, consists of an outer bay about one mile square and the tidal and navigable portion of the Wepawaug River. The outer bay is exposed to the south and is seldom used for anchorage. The inner portion, where all the shore facilities are located, has been Federally improved for navigation by construction of protective jetties, and channels and anchorages 10 and 8 feet deep. One of the authorized anchorages has not been completed.

2. Milford Harbor is now used by a fleet of about 350 recreational craft, 8 commercial fishing boats, and 2 governmental craft. The existing anchorages are overcrowded so that many craft moor in the channel and there is no space for additional craft. The recent growth of recreational boating has created an increasing demand for anchorage facilities in the area.

3. Local interests requested completion of the presently authorized anchorage, and modification of the project to provide for construction of new areas to meet the need for anchorage, and requested breakwaters for the outer harbor and increased height for the inner harbor jetties to provide additional protection for recreational craft.

4. Improvements Considered: The improvements requested by local interests have been considered. Study of the inner harbor jetties indicated that

little additional shelter would be provided by any increase in their height. Additional protection could be provided by extending the east jetty but this would make normal navigation more difficult and increase vessel damages. Because loss or lowering of the authorized jetties would result in substantially increased damages, it is considered that the jetties should be maintained as authorized. Consideration of breakwaters to shelter the outer harbor indicated that the necessary structure would cost over 4 million dollars and that the benefits would not, in any sense, be commensurate with the cost.

5. Recommended Improvement: The recommended improvement would provide the additional anchorage desired by modifying the existing project to provide an additional 8.5 acres of anchorage 6 feet deep on the west side of the harbor. The modification would be subject to the conditions of local cooperation stated in paragraph 6 below. Estimated first costs, annual cost, and annual benefits based on July 1960 prices, a 50-year project life and an interest rate of $2\frac{1}{2}$ percent for Federal and $3\frac{1}{2}$ percent for non-Federal investment are as follows:

Estimated first costs:

Federal construction	\$110,000
Preauthorization studies	7,000
Non-Federal cash contribution	<u>110,000</u>
Total	\$227,000

Estimated annual costs:

	<u>Federal</u>	<u>Non-Federal</u>	<u>Total</u>
Interest & Amortization	\$4,100	\$3,900	\$8,000
Maintenance	<u>2,000</u>	<u>800</u>	<u>2,800</u>
Total	\$6,100	\$4,700	\$10,800

Estimated annual benefits:

Recreational	\$15,000
Land Enhancement	<u>800</u>
Total	\$15,800
B/C Ratio	1.5

6. Apportionment of Costs and Local Cooperation: Local interests would be required to contribute 50 percent of the construction cost of providing an additional 8.5 acres of anchorage 6 feet deep on the west side of the harbor in recognition of the recreational benefits expected, which are considered equally local and general in nature. The recommended requirements of local cooperation are:

- a. Contribute in cash prior to construction 50 percent of the construction cost of the project modification, the contribution now estimated at \$110,000 but the final determination to be made after completion of the work,
- b. Hold and save the United States free from damages from construction and maintenance of the project.
- c. Provide without cost to the United States all lands, easements, rights-of-way and spoil disposal areas necessary for construction and maintenance of the project.

7. Discussion: The recommended improvement is a logical and economically feasible means of meeting the present and reasonably prospective needs of navigation at Milford Harbor. Local interests have approved this improvement and appear willing to meet the requirements of local cooperation. Analysis on the basis of a 100-year life and $2\frac{1}{2}$ percent

interest would increase the benefit-cost ratio slightly, assuming no change in the annual cost of maintenance over the longer period. The project is considered amply justified on the basis of studies and criteria in the report. The proposed local cooperation is consistent with other similar projects.